# PRINTING APPARATUS

BACKGROUND OF THE INVENTION

1.  Field of the Invention

    The present invention relates to a printing apparatus to be shared between a plurality of users, and more particularly to a printing apparatus having a confidential print function of holding print jobs designated in advance until password entry.

2.  Description of the Related Art

    Printing apparatuses shared between a plurality of users produce printed outputs as required. This involves a problem that printed matters to be kept secret can possibly be exposed to other users.

    To overcome this problem, Japanese Patent Laid-Open Publication No.Hei 8-244315 discloses a technology as to an image forming apparatus and method that comprise a print function in which a user sends password-protected print data to the printing apparatus in advance, and the printing apparatus holds the print data so that the printing is not started until the user who has requested the printing actually operates the printing apparatus to enter the password. Hereinafter, this function will be referred to as confidential print function, since the printed output cannot be obtained unless the user by himself/herself enters the password.

    In the above-described image forming apparatus, however, if normal printing is performed when the user comes to the printer location to enter a command for starting the confidential print (secret print) into the image forming apparatus, there arises a

waiting time.

Accordingly, Japanese Patent Laid-Open Publication No.Hei 11-91210 discloses, against the above-mentioned problem, a technology as to a printer system which suspends normal printing so as to
5 print secret data preferentially.

For another method of outputting printer-input data in sequence yet outputting data of urgent necessity in preference to the other data, Japanese Patent Laid-Open Publication No.Hei 5-189174 discloses a technology as to a method of controlling a
10 plurality of print queues in which a plurality of print queues allocated to individual print modes produce printed outputs in accordance with the priority attributes and the order of input.

The printer system disclosed in Japanese Patent Laid-Open Publication No.Hei 11-91210 described above gives higher priority
15 to the secret data print, thereby reducing the users' waiting time in printing secret data. Nevertheless, if a plurality of users successively instruct secret data print from their PCs, a plurality of pieces of secret data are output in succession. This requires the prevention of a mix-up between the printed outputs.
20 Moreover, the plurality of users come to the printer location to fetch their printed outputs, increasing the possibility of exposure of the printed outputs to other users.

On the other hand, the method of controlling a plurality of print queues disclosed in Japanese Patent Laid-Open Publication
25 No.Hei 5-189174 is to execute print jobs in order of acceptance of the print requests. Therefore, entering a plurality of pieces of privilege attribute data can possibly preclude outputs in the

2

user-expected order.

For example, if privilege attribute data is entered during the execution of a print job, this print job is completed before a print job corresponding to the privilege attribute data is executed. Then, print jobs for normal data follow in order of acceptance of their print requests. Accordingly, the print jobs previously input as normal data, though their earlier outputs are desired, sometimes output after the print job for privilege attribute data does.

SUMMARY OF THE INVENTION

The present invention has been achieved in view of the foregoing problems. It is thus an object of the present invention to provide a printing apparatus in which even if passwords for a plurality of confidential prints are entered successively, the confidential prints can be executed in order of password entry and at appropriate intervals so that the confidential prints, whether congested or not, can be kept secret from each other.

To achieve the foregoing object, the present invention provides the following configurations.

(1) A printing apparatus having a confidential print function of executing print jobs transmitted from data output devices in order of receipt and holding print jobs designated in advance until password entry, the printing apparatus comprising a queue management unit for executing, when passwords for held confidential print jobs are entered, the confidential print jobs in order of password entry, in preference to awaiting normal print

3

jobs which require no password entry.

According to this configuration, the queue management unit in the printing apparatus having the confidential print function of executing print jobs transmitted from data output devices in order

5 of receipt and holding print jobs designated in advance until password entry executes, when passwords for predesignated, held confidential print jobs are entered, the confidential print jobs in order of password entry in preference to awaiting normal print jobs which require no password entry. In conventional confidential

10 printing, when for example a plurality of users entered passwords in succession during the execution of a print job, the print job was completed before those print jobs were executed in order of acceptance of the print requests. In contrast, print jobs here can be executed in order of password entry to the printer, whereby the

15 users are prevented from getting the printed outputs mixed up. Besides, this mix-up prevention no longer requires such a troublesome procedure that a user withholds password entry until the previous user having entered a password first takes his/her printout away.

20 (2) The queue management unit is characterized in that it stores received confidential print jobs into a queue with a print hold status, moves a password-entered confidential print job to the end of print jobs stored in the queue, and executes confidential print jobs in order of release of the print hold

25 status through password entry.

According to this configuration, the queue management unit in the printing apparatus stores received confidential print jobs

4

into its queue with a print hold status. When passwords are entered, the queue management unit moves the corresponding confidential print jobs to the end of print jobs stored in the queue and then executes the confidential print jobs in order of

5      release of the print hold status through the password entry. Accordingly, in an apparatus capable of inputting passwords for confidential print jobs during other confidential printing, the print jobs are moved to the queue end so that even if passwords for a plurality of confidential print jobs are entered, the jobs

10     become printable in order of acceptance of the entries. Therefore, print outputs can be obtained in the user-entered order.

(3) There is provided time keeping means which keeps a predetermined time from the execution of a confidential print job to the execution of the next confidential print job. The queue

15     management unit is characterized in that it executes, having completed a confidential print job, the next confidential print job at least after a lapse of the predetermined time kept by the time keeping means.

According to this configuration, the queue management unit,

20     having completed a confidential print job, executes the next confidential print job at least after a lapse of the predetermined time kept by the time keeping means. Therefore, even if a plurality of users enter passwords in succession, the confidential print jobs are executed at no less than the predetermined time

25     intervals. Accordingly, the users are prevented from an accidental view of confidential printouts of others. Besides, even though the confidential print jobs are executed in preference to normal print

jobs irrespective of the order of job acceptance, a predetermined time interval is provided between any confidential print jobs overlapping each other. This can avoid overuse of confidential prints, such as unnecessary executions for the sake of print priority.

(4) The queue management unit is characterized by the provision of a pointer for indicating the end of confidential print jobs stored in the queue.

According to this configuration, the queue management unit has a pointer that indicates the end of the confidential print jobs stored in the queue. Therefore, in this simple configuration, password-entered confidential print jobs can be easily moved to behind the last confidential print job without searching the queue contents upon each queue rearrangement.

(5) The queue management unit is characterized by the provision of a pointer for indicating the end of normal print jobs stored in the queue.

According to this configuration, the queue management unit has a pointer that indicates the end of the confidential print jobs stored in the queue. Therefore, in this simple configuration, normal print jobs can be easily moved to behind the last normal print job without searching the queue contents upon each queue rearrangement. This ensures printing to be executed in order of acceptance of normal print jobs.

(6) The queue management unit is characterized in that it stores confidential print jobs into the top side of a single queue, stores normal print jobs into behind the confidential print

6

jobs, and has pointers both at the end of the confidential print jobs and at the end of the normal print jobs.

According to this configuration, the queue management unit stores confidential print jobs into the top side of a single queue and sets a pointer at that end, as well as stores normal print jobs into behind the confidential print jobs and sets another pointer at that end. This makes it possible to share a memory between confidential print jobs and normal print jobs without such a control as dynamic memory allocation. The confidential print jobs can be processed in preference to the normal print jobs, with a reduction in the waiting time of the users who come to the printer location.

The nature, principle, and utility of the invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings in which like parts are designated by like reference numerals or characters.


BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Fig. 1 is a block diagram showing the configuration of a printing apparatus according to an embodiment of the present invention;

Fig. 2 is a diagram explaining the operation of a queue management unit 16;

Fig. 3 is a flowchart showing a password entry process;

Fig. 4 is a flowchart showing a job selecting process;

Fig. 5 is a block diagram showing the configuration of a

printing apparatus according to another embodiment of the present

invention; and

Fig. 6 is a diagram explaining the operation of a queue

management unit 26.

5

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, description will be given of a printing apparatus

according to an embodiment of the present invention with reference

to Figs. 1 through 4. Fig. 1 is a block diagram showing the

10  configuration of a printing apparatus 1 according to the

embodiment of the present invention.

A printer 1, or the printing apparatus, comprises a control

unit 11 for controlling the respective components of the

apparatus, a display 18, an input unit 19, a timer 20, a network

15  interface (I/F) 2, a print data storing unit 21, and a printer

engine 15.

The control unit 11 consists of a print job input unit 12, a

print data dividing unit 13, a queue management unit 16, a print

output unit 14, and a confidential processing unit 17.

20  The display 18 is display means for displaying the print data

stored in the print data storing unit 21. This display 18 is

connected to the confidential processing unit 17.

The input unit 19 is input means for inputting passwords and

the like to execute confidential print jobs. The input unit 19 is

25  connected to the confidential processing unit 17.

The timer 20 is time keeping means which is connected to the

queue management unit 16 and keeps time so that a plurality of

confidential prints are executed at intervals greater than or equal to a predetermined amount of time.

The network interface 2 connects the printer 1 to a network 3. The printer 1 is connected through the network 3 to computers, or a plurality of host units 4, 5, 6, and so on. Through the network 3, the network interface 2 receives print jobs transmitted from the output devices of the host units 4-6 and the like, and outputs the same to the print job input unit 12. Here, print data and print requests are input to transmit the print jobs from the output devices.

The print data storing unit 21 stores print data that is sent from the print job input unit 12 and the print data dividing unit 13. The print data stored is output to the print output unit 14.

The printer engine 15 prints the print data output from the print output unit 14 onto recording media such as sheets of paper.

The print job input unit 12 in the control unit 11 outputs the print jobs received through the network interface 2 to the print data storing unit 21. Besides, the print job input unit 12 outputs the print requests for the print jobs to the queue management unit 16.

Here, mass print data is output from the print job input unit 12 to the print data dividing unit 13 so that the print data is divided by the print data dividing unit 13 before output to the print data storing unit 21.

The queue management unit 16 stores the print requests, which are input along with the print data, into its queues in order of acceptance. Note that the queues consist of a confidential print

queue and a normal print queue.

The print output unit 14 reads print data from the print data storing unit 21 in accordance with instructions from the queue management unit 16, apply decompression, correction, and other processing to the data, and outputs the resultant to the printer engine 15.

The confidential processing unit 17 outputs, to the queue management unit 16, the information on passwords entered from the input unit 19. In addition, upon password entry for a confidential print job, the confidential processing unit 17 displays on the display 18 a list of print requests for confidential print jobs. Moreover, the confidential processing unit 17 checks the password entered from the input unit 19 against the password that is attached to the print data.

The individual components of the printer 1 are tied in operation as described below. That is, print data for print jobs received by the network interface 2 is stored into the print data storing unit 21 through the print job input unit 12 and the print data dividing unit 13 in the control unit 11.

On print output, print data read out from the print data storing unit 21 is subjected to data decompression, correction, and other processing in the print output unit 14 before printed by the printer engine 15.

The print requests for the print jobs, input from the network interface 2 along with the print data, are input to the queue management unit 16 through the print job input unit 12. Then, normal print job requests and confidential print job requests are

managed within the respective queues in order of receipt.

At the occasions when a user enter the password for a
confidential print job, the confidential processing unit 17
displays a list of confidential print jobs onto the display 18.
5  The confidential processing unit 17 also checks the password
entered by the user from the input unit 19, which comprises a
keyboard and the like, against the password that is attached to
the print data.  The queue management unit 16 stores, at the point
of receipt, the print requests for the confidential prints with a
10 print hold status.  Valid password entries by users release the
hold status so that printing is performed as detailed below.

Fig. 2 is a diagram explaining the operation of the queue
management unit 16.  As mentioned above, the queue management unit
16 has two queues, i.e., a queue for confidential print jobs and a
15 queue for normal print jobs.  Pointers are provided both at the end
of the confidential print jobs and at the end of the normal print
jobs.  Then, newborn print jobs are stored into the ends of the
corresponding queues.  Here, the letter "H" on a confidential print
job indicates a hold status.  The printing priority is given in
20 order of release of the hold status through valid password entry.

Fig. 2(1) shows a case where a normal print job a is in
process, and split normal print jobs b1, b2 and a normal print c
are awaiting with priority in this order.  In addition, all
confidential print jobs A, B, and C are in a hold status, the
25 print jobs being queued in this order.

When a user enters a valid password for the confidential
print job A from the input unit 19 of the printer 1, the control

11

unit 11, as shown in Fig. 2(2), releases the hold status of the
confidential print job A. The control unit 11 also refers to the
end pointer on the confidential print jobs and moves the
confidential print job A to the end of the confidential print
5    jobs. Here, the normal print job a is still in process.

Next, on receiving a new confidential print job D, the
control unit 11, as shown in Fig. 2(3), refers to the end pointer
on the confidential print jobs and stores the confidential print
job D into behind the end of the confidential print jobs, or the
10   confidential print job A. Here, the normal print job a is still in
process.

When a user enters a valid password for the confidential
print job C from the input unit 19, the control unit 11, as shown
in Fig. 2(4), releases the hold status of the confidential print
15   job C. The control unit 11 also refers to the end pointer on the
confidential print jobs and moves the confidential print job C to
the end of the confidential print jobs.

In this state, the normal print job a is completed. Then, as
shown in Fig. 2(5), the control unit 11 skips the held
20   confidential print jobs B and D to process the confidential print
job A which is the first released of the hold status among the
unheld confidential print jobs.

When the confidential print job A is completed, the control
unit 11 exercises such processing that no confidential print job
25   follows immediately, though the job of next priority is the
confidential print job C. More specifically, the control unit 11,
as shown in Fig. 2(6), processes the normal print job b1 which is

12

the first received among the awaiting normal print jobs b1, b2, and c. The reason for this is to provide an interval between confidential prints so that the confidential prints are kept secret from each other even in the cases of congestion.

5      By the way, if the normal print job to be executed between the confidential print jobs involved a large amount of print data, the user waiting for the completion of the latter confidential print job would be kept awaiting beside the printer 1 for a long time. In view of this, print jobs with mass print data are divided
10     by the print data dividing unit 13 so that the span of time between confidential print jobs may not be long.

       Next, with reference to Figs. 3 and 4, description will be given of the operation of the printer 1. Fig. 3 is a flowchart showing a password entry process. Fig. 4 is a flowchart showing a
15     job selecting process.

       To start the password entry process, the control unit 11 of the printer 1 displays a list of confidential print jobs on the display 18 (s1). A user specifies a confidential print job to enter a password for (s2). Then, the user enters the password for
20     the confidential print job specified (s3). The control unit 11 checks the password attached to the print data of the target job against the password entered (s4). If the entered password is invalid, the control unit 11 displays an error message such as "Invalid Password" on the display 18 (s7), and terminates the
25     processing.

       If the entered password is authenticated as valid, the control unit 11 moves the target job to the end of the

13

confidential print jobs (s5). Then, the control unit 11 releases the hold status of that confidential print job (s6), and terminates the processing.

Next, with reference to Fig. 4, description will be given of the print job selecting operation by the printer 1. The control unit 11 waits until a print job in process is completed (s11). After the completion of the print job, the control unit 11 determines whether the print job having been processed is a confidential print job (s12). If the print job having been processed is a confidential print job, the control unit 11 resets the timer 20 so that the timer 20 restarts keeping time (s13).

On the other hand, if not a confidential print job at the step s12, the execution of the step s14 follows.

The control unit 11 searches for a confidential print job processable (s14). Then, whether there is any confidential print job processable is determined (s15). If there is a confidential print job processable, the control unit 11 confirms whether a predetermined time has elapsed since the processing of the previous confidential print job (s16). If the predetermined time has elapsed, the control unit 11 selects the confidential print job in the queue top (s17), start printing (s18), and terminates the job selecting process.

On the other hand, if there is no processable confidential print job at the step s15, a normal print job printable is searched for (s24). Then, a determination is made as to whether there is any normal print job processable (s25).

If any normal print job processable exists, the control unit

14

11 selects the normal print job in the queue top (s23), start printing (s18), and terminates the job selecting process.

Meanwhile, if there is no processable normal print job at the step s25, the job selecting process is terminated.

Now, if the predetermined time has not elapsed at the step s16, a normal print job printable is searched for (s21). Then, a determination is made as to whether there is any normal print job processable (s22).

If any normal print job processable exists, the control unit 11 selects the normal print job in the queue top (s23), start printing (s18), and terminates the job selecting process.

On the other hand, if there is no processable normal print job at the step s22, the control unit 11 returns to the step s16 to repeat the loop consisting of the steps s16, s21, and s22 until the predetermined time has elapsed.

Such execution of confidential print jobs in order of password entry as described above can prevent users from getting the printed outputs mixed up. It can also eliminate such a troublesome procedure for preventing a printed outputs mix-up that a user withholds password entry until the previous user having entered a password first takes his/her printout away.

Moreover, when a plurality of users enter passwords successively, the confidential print jobs are not output in succession, but a following confidential print job is executed at least after the elapse of the predetermined time. This makes it possible to prevent confidential printed outputs from accidental exposure to other users.

15

Furthermore, confidential print jobs are processed in preference to normal print jobs. This allows a reduction in the waiting time of the users who come to the printer location to fetch the printed outputs.

5    In addition, while confidential print jobs are executed in preference to normal print jobs irrespective of the order of job acceptance, a predetermined time interval is provided between any confidential print jobs overlapping each other. This can avoid overuse of confidential prints, such as unnecessary executions for the sake of print priority.

10    The queue management unit 16 sets a pointer at the position of the last confidential print job in its queue. Therefore, in this simple configuration, password-entered confidential print jobs can be moved to behind the last confidential print job without searching the queue contents upon each queue

15    rearrangement.

Now, another embodiment of the present invention will be described with reference to Figs. 5 and 6. Fig. 5 is a block diagram showing the configuration of a printing apparatus

20    according to the another embodiment of the present invention. The printer 31 shown in Fig. 5 is provided with a queue management unit 26 instead of the queue management unit 16 in the control unit 11 of the printer 1 shown in Fig. 1. This queue management unit 26 stores confidential print jobs and normal print jobs into

25    a single queue, with the confidential print jobs at the queue top side and the normal print jobs behind the same.

Pointers are provided both at the end of confidential print

16

jobs and at the end of normal print jobs. The pointer at the end

of confidential print jobs indicates the border between the

confidential print jobs and the normal print jobs. Incidentally,

the components other than the queue management unit 26 have the

5    same configurations as those of the printer 1 shown in Fig. 1.

Therefore, description will be omitted of the individual

components of the printer 31.

Fig. 6 is a diagram explaining the operation of the queue

management unit 26. As mentioned above, the queue management unit

10   26 has pointers set at the ends of the confidential print jobs and

the normal print jobs. Newborn print jobs are added into the ends

of the corresponding queues. Then, confidential and normal print

jobs released of the hold status through valid password entry

become printable in order of arrangement.

15   Fig. 6(1) shows a case where a normal print job a is being

printed, and confidential print jobs A, B, and C awaiting are in a

hold status. Besides, split normal print jobs b1, b2 and a normal

print job c have priority in this order.

When a user enters a valid password for the confidential

20   print job A from the input unit 19, the control unit 11, as shown

in Fig. 6(2), releases the hold status of the confidential print

job A. The control unit 11 also refers to the end pointer on the

confidential print jobs and moves the confidential print job A to

the end of the confidential print jobs.

25   Next, on receiving a new confidential print job D, the

control unit 11, as shown in Fig. 6(3), refers to the end pointer

on the confidential print jobs and stores the confidential print

17

job D into behind the end of the confidential print jobs.

When a user enters a valid password for the confidential print job C from the input unit 19, the control unit 11, as shown in Fig. 6(4), releases the hold status of the confidential print job C and moves the job to the end of the confidential print jobs.

In this state, the normal print job a is completed. Then, as shown in Fig. 6(5), the control unit 11 processes the confidential print job A which is the first released of the hold status among the unheld confidential print jobs.

When the confidential print job A is completed, the control unit 11 exercises such processing that no confidential print job follows immediately, though the job of next priority is the confidential print job C. More specifically, the control unit 11, as shown in Fig. 6(6), processes the normal print job b1 which is the first accepted among the normal print jobs b1, b2, and c.

The use of the pointers like this makes it possible to share a memory between confidential print jobs and normal print jobs without such a control as dynamic memory allocation.

In the foregoing embodiments, when a password is entered to release the hold status of a confidential print job during the processing of a previous print job, this previous print job is completed before the confidential print job is processed. Alternatively, an interruption may be made so that a normal print job is suspended to execute a confidential print job if a predetermined time has elapsed since the completion of the previous confidential print job.

Moreover, while Figs. 1 and 5 have shown the embodiments

18

where the printing apparatus is directly connected to a network, the present invention is not limited thereto. For example, serial- and parallel-interface connections to a server that is connected to the network are also available as long as a plurality of users

5  share the printing apparatus.

The present invention offers the following effects.

(1) The queue management unit in the printing apparatus having the confidential print function of executing print jobs transmitted from data output devices in order of receipt and

10  holding print jobs designated in advance until password entry executes, when passwords for predesignated, held confidential print jobs are entered, the confidential print jobs in order of password entry in preference to awaiting normal print jobs which require no password entry. Therefore, the print jobs can be

15  executed in order of password entry to the printer, thereby preventing the users from getting the printed outputs mixed up. Moreover, printed outputs can be obtained without such a troublesome procedure for preventing a printed outputs mix-up that a user withholds password entry until the previous user having

20  entered a password first takes his/her printout away.

(2) The queue management unit in the printing apparatus stores received confidential print jobs into its queue with a print hold status. When passwords are entered, the queue management unit moves the corresponding confidential print jobs to

25  the end of print jobs stored in the queue and then executes the confidential print jobs in order of release of the print hold status through the password entry. Accordingly, in the apparatus

19

capable of accepting passwords for confidential print jobs during

other confidential printing, the print jobs are moved to the queue

end so that even if passwords for a plurality of confidential

print jobs are entered, the jobs can be printed in order of

5    acceptance of the entries.  Therefore, print outputs can be

obtained in the user-entered order.

(3) The queue management unit, having completed a

confidential print job, executes the next confidential print job

at least after a lapse of the predetermined time kept by the time

10   keeping means.  Therefore, even if a plurality of users enter

passwords in succession, the confidential print jobs are executed

at least with the predetermined time intervals.  This can prevent

confidential printouts from an accidental view by other users.

Besides, even though the confidential print jobs are executed in

15   preference to normal print jobs irrespective of the order of job

acceptance, a predetermined time interval is provided between any

confidential print jobs overlapping each other.  This can avoid

overuse of confidential prints, such as unnecessary executions for

the sake of print priority.

20   (4) The queue management unit has a pointer that indicates

the end of the confidential print jobs stored in the queue.  Thus,

in this simple configuration, password-entered confidential print

jobs can be easily moved to behind the last confidential print job

without searching the queue contents upon each queue

25   rearrangement.

(5) The queue management unit has a pointer that indicates

the end of the normal print jobs stored in the queue.  Therefore,

20

in this simple configuration, normal print jobs can be easily moved to behind the last normal print job without searching the queue contents upon each queue rearrangement. This ensures printing to be executed in order of acceptance of normal print

5    jobs.

(6) The queue management unit stores confidential print jobs into the top side of a single queue and sets a pointer at that end, as well as stores normal print jobs into behind the confidential print jobs and sets another pointer at that end. This

10   makes it possible to share a memory between confidential print jobs and normal print jobs without such a control as dynamic memory allocation. The confidential print jobs can be processed in preference to the normal print jobs, with a reduction in the waiting time of the users who come to the printer location to

15   fetch the printed outputs.

While there has been described what are at present considered to be preferred embodiments of the invention, it will be understood that various modifications may be made thereto, and it is intended that the appended claims cover all such modifications

20   as fall within the true spirit and scope of the invention.